Sadtler, Kaitlyn 2020

Dr. Kaitlyn Sadtler Oral History

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Behind the Mask Oral Histories:

Kaitlyn Sadtler

October 9, 2020

Interviewed by Gabrielle Barr, Office of NIH History and Stetten Museum Archivist.

Barr: Good afternoon. Today is October 9, 2020 and I have the pleasure of speaking with Dr. Kaitlyn Sadtler. She is the Chief of the Section of Immuno-engineering at the National Institute of Biomedical Imaging and Bioengineering (NIBIB). Thank you for speaking about your COVID-19 experiences for our Behind the Mask Project. Dr. Sadtler, can you briefly outline the major serology study that you've recently been a part of that is looking at detecting antibodies in those that do not have significant COVID-19 symptoms?

Sadtler: Thanks so much for having me. I really appreciate the opportunity to chat and talk about what it's been like at the NIH throughout the pandemic.

Our study is focused on understanding the proportion of the population that has had a corona infection or has been infected with Sars-COVID-19-2 virus. What we're doing is looking at the antibodies as kind of the footprint of the virus; it tells you the virus has been there. Persons, then, if seropositive, have antibodies in the blood against the virus. It means they've had the infection.

What we decided to do is launch something called a serologic survey or a zero circuit. So, what we are doing is we are collecting blood from ten thousand donors across the United States. This is a collaborative effort within multiple institutes and centers of the NIH, including NIBIB as you mentioned is my institute; the National Institute for Allergy and Infectious Disease or NIAID; the National Center for Advancing Translational Sciences, NCATS; and also Frederick National Laboratory for Cancer Research or FNLCR up in Frederick, Maryland. There are quite a few of us working. So, it's a big team effort. It kind of shows what can happen when different institutes of the NIH come together. It's a big study and a big effort with lots of people involved.

What we do is figure out a way to sample blood from people without them having to come into the clinic. They don't have to come in; they don't have to get a blood draw like you would if you were donating blood, and they just prick their finger and absorb it to a little sampling device and then dry it out. They send back the dried blood which we receive in the mail. We literally just send it via the mail. It comes to our lab. Then we can get the antibodies off of these dried blood sampling devices.

Barr: Are you worried about any mishaps of people doing it themselves or is it very easy to do?

Sadtler: It is a very easy to do process. Our donors are given a bit of a tutorial over the phone. When they are first enrolled, they are referred to some video material that's available through the company website. They also have an instruction booklet that comes in the kit. They aren't just sent a sampling device. They are sent a full kit which is very easy to use; you just prick your finger and take the sampling device and hold it up against it. It absorbs your blood. The vast majority of the donors that have sent the kits back did it perfectly, so we had less than one percent of our donations were errors to a point we couldn't use the kits. 99% of the samples that we got back were usable.

Barr: That's really, really great. How did you vet your population? I know that you've gotten a lot of people who said they wanted to be a part of this study. How did you vet which ones you took? I know you wanted a very diverse sample.

Sadtler: Our goal was to get a representative population that mimicked best equal to what we would see in the U.S.— geographically, age, race, sex, everything that we wanted to make sure looked like the United States. So, what we did was we went ahead and we took the census data and we looked at the proportion of the U.S. population that fell into those categories. Then we matched that up with our 10,000-donor set and said okay, who do we need and what do we need for this to be representative? After that we knew what we needed.

We had about 400,000 people volunteer for the study. They sent us their basic information and a computer program actually was able to go and pick out of those 400,000 people, volunteers who would be our donors. Thankfully, we had enough volunteers that we were able to meet the vast majority of our recruitment goals. We have a very representative population in part due to just our massive volunteer pool. So, thanks so much to everyone that volunteered for the study, even if you weren't selected as a donor. We really appreciate it.

Barr: That is really great. What has been your role in this study?

Sadtler: We're the lab that does all the testing. If you were one of our donors and you mailed in your sample, you mailed it to my laboratory address. So, all of those 10,000 samples came back to us; we isolated the antibodies off of them and we tested them for the presence of antibodies against the Sars-Cov-2 virus.

Specifically, what we were looking at were the spike protein, which is the protein around the outside, so we could stick that to the bottom of a dish in the lab and check to see if we could get antibodies that bind that. Also, from that spiked protein we have specifically the receptor-binding domain, or RBD, which a lot of people have heard of. That correlates well with viral neutralization which means the antibodies can stop the virus from spreading. We tested both of those and we looked at three types of antibodies—IgG, IgM and IgA—we love letter soup as immunologists. IgM is the quickest earliest responding in your blood. IgG is the ones that last a longer time and they're more specific; and then IgA are most commonly found on your mucosal surfaces. If you think this is a respiratory infection, you're going to have these IgA antibodies popping up. A total of six things from each sample.

Barr: What kind of tools and programs did you use to do your testing?

Sadtler: The first thing we did was we wanted to develop an assay that in its purest and most basic form could be repeated by as many people that wanted to regardless of their resource setting. We didn't want to pick something that was too niche to a specific type of instrumentation or a specific type of reagent. So, we utilized an enzyme linked immunoabsorbent assay, or ELISA for short, which is a common laboratory technique. You take the viral proteins, not the virus itself; you stick it to the bottom of a plate, and then you add in your sample, and, if there are antibodies that recognize that protein, meaning it would recognize the virus, then they'll bind to those proteins that are stuck to our plate in the lab and then we can add on one more thing on the top of that which will recognize the antibody. That gives off a colorful signal; the plate turns blue. We've got antibodies! So we used an ELISA to kind of increase our throughput and increase the number of samples that we could use. We used the robotic setup to do an automation of it. We have a robot that can help do different steps of the assay; we don't have to do all of it by hand.

Barr: I'm sure that's helpful. Did you encounter any challenges when you were analyzing these data and going through this process?

Sadtler: I can say, we broke the machine once. That was a challenge. We had one day when something often looked wrong with this. We wound up calling the company and realizing we used the machine so much that we broke it. So, there was a moment of what's wrong and then we just ordered a replacement part, and everything was back to normal. Those kinds of fun, little hiccups, that you wonder, oh, gosh, what happened?

And then I guess the biggest thing was to make an assay that is highly specific, highly sensitive, and make sure that it works well repeatedly. We spent a lot of time developing and characterizing this assay to begin with because people are variable and the samples are going to be variable, so you need your assay to be as clean as possible.

Barr: Now you are at the point of the process where you're doing a lot of data analysis. How are you going about your data analysis? What is that process like?

Sadtler: With that we've brought on a team of statisticians. So, when you have big data like this, it's important to consult with people that really know how to handle the big data. So, we're working in a collaborative group. We have, I believe, four statisticians that are currently working on our data analysis to go ahead and understand the quality of the data, really putting together the code that can allow us to analyze these data and allow us to say with what certainty we are of certain conclusions.

It's a mix of working directly with our statisticians and then also through dashboard-based software where you can input all of that data. Then it's a bit more user-friendly to go through it and say, We did the statistical analysis on the front end, now, let's look at this as how do we see serial positivity as a function of space, as a function of geography, as male versus female. We have all of the statistics up front and then we can go ahead and apply those good statistics to our data analysis that you would see up front in the manuscript, which would be things like those specific variables that we're asking about.

Barr: Do you think that some of the knowledge that you and your team have gained so far will help the United States prepare for its second wave and, if so, how?

Sadtler: We do hope that the knowledge that we've gained with this and the information we can further dissect from our studies will be helpful to public health officials. We can start to understand the extent of the spread of the virus, as to how much the population is still potentially vulnerable to infection and also what areas may have been hit harder, what groups of people may have been hit harder, or all of these different things which can be integrated with the knowledge from testing and knowledge from where the virus has been based off of our viral testing programs—to understand how to potentially prevent stronger outbreaks in the future and see how we can get maybe a step up by using science to understand how to protect ourselves against this virus.

Barr: Definitely. Can you envision subsequent studies arising from what you've done so far?

Sadtler: We actually have several different research studies that have branched off of this, both kind of looking at smaller specific populations. For example, we have one collaborative project with the National Highway Transit Safety Administration, or NHTSA, looking at trauma victims. As trauma victims actually have a higher incidence of infectious diseases, such as HIV and hepatitis, they were curious as to whether or not that translated as well to COVID-19. We're helping them out with that. They have their set of patients who are first responders to trauma so they're also looking at that group. So we've got a trauma victim study.

We are also helping out with the rare disease network within NCATS and we're starting to launch a study on understanding how COVID-19 might be affecting these patients that have rare diseases, a smaller proportion of the population but still a solid number of people in the United States. Moving on with this study with this large national zero survey, we've recently partnered with the NCI zero net to expand this into two follow-up time points, so we'll be looking at six and twelve months after our initial study to follow the same group of people to see if we wind up getting more people that were negative that are now positive, and how many of the people that were positive might lose their antibodies or might still have their antibodies—what the patterning starts to look like as time goes on. So, we have multiple studies that have branched off of this and we're hoping to learn a whole lot over the next year.

Barr: Yes, that would be very helpful. You lead a lab of many people. What has it been like to have to adapt at this time to some of the health precautions as well as to attend to some of the professional and emotional needs of those who work for you and with you?

Sadtler: The biggest thing for us here is to keep our people safe, so the people that are on campus—we're researching COVID-19—still have to protect ourselves against COVID-19. Everyone in the laboratory always is wearing a mask. When we come onto campus, we put our masks on. When people are researching in the lab, they have their mask on. Even if they're the only person in the lab, they still have their mask on. We stay six feet apart. We maintain our distancing in the laboratory. We don't have full capacity in our lab, not every single person is in every single day. We have to minimize the number of people that are here. For our laboratory space specifically, we have about four to five people in per day. That's as much as we can, given our space, but usually about three to four just to be careful. We just kind of have to work out our schedules and make sure that we don't put too many people in the laboratory at once, that everyone feels safe, that everyone's wearing a mask and, of course, everybody wants to jump into research and dive in. We're scientists. We're excited about stuff. It is a little bit of that holding back and knowledge that tomorrow might be a telework day. That's the way that COVID-19 is and there's a lot of stuff that scientists can learn while they're at home. But, of course, we like to get in there and we like to dig in. We like to do the experiments so it's hard to have that kind of pullback mentality. We need to give people spacing and everybody needs to feel safe.

Barr: That's very true. As a scientist, how are you balancing the pressure to be very accurate and thorough in your pursuits, but in this time of COVID-19 there's this idea that we need to get things out as quickly as possible?

Sadtler: That is something that we ran into very early on. We had a strong pressure to finalize an asset rather immediately and our goal was to test it and retest it. If we just jumped in and started running samples on an assay that did not have high specificity, the data would not be as worthwhile. What we did was we focused on our schedule and we focused on how much time we could use for assay development. We really wanted to focus on that, so we chose to take our time and wound up having a very, very clean and a very reproducible assay. That was difficult, of course, as assays are flying out left and right for the COVID-19 serology. We knew that just spending the time to make sure that it was done right was more important.

I would say that it has been difficult because you do feel that pressure. It's a very odd feeling in science as sometimes you feel pressure to get things published quickly. The idea that another lab is doing something similar to me has that pressure. At the same time, it's not a global pandemic and it's not public health that is the pressure. Yeah, it's been very stressful over the past few months because as many scientists, I'm a perfectionist. We want it to be perfect. I have told our lab, I saw the day's set of samples and I can rerun those tomorrow. I just want to make sure it will look exactly the same the next day. It's just if something looks slightly different, then I want to rerun it and check it. It's that balance of taking your time making sure it's correct, because there is a whole lot waiting on you doing proper science. There's a solid amount of waking up at three o'clock in the morning going, "I'm sure all is well."

Barr: This question is more from your point of view as a person who is going through the pandemic not just as a scientist: What have been some personal challenges dealing with the pandemic as well as some silver linings that have come along with it?

Sadtler: I think with everybody it has been a challenge to be missing those social gatherings, missing hanging out with friends. We like everybody. I would love to go out to a restaurant or go to a brewery and grab a drink with a friend after work. It's odd because recently when we finish running samples for this exact project, if it weren't during a pandemic, I would have said, "We're gonna go celebrate; let's go celebrate that we finished the study." It's been rough. There are things that I very much miss. I was supposed to go to Kilimanjaro and hike Kilimanjaro.

Barr: That would have been an incredible experience. It would have been fantastic.

Sadtler: We had to cancel that trip because it just wasn't safe. There's a whole bunch of things that stink, but we deal with the hand that we were dealt as individuals. It's been tough but we've figured out ways around it. I have a sister I'm very close with and I have a brother also that both live in Maryland. We've been able to get together outside, maintain distance. We've been able to take advantage of some of the nice weather and still spend time with each other, albeit slightly modified from how we would normally.

I guess silver linings...I would say as a scientist it's mostly working on COVID-19 that has really helped me integrate more with NIH. I'm relatively new here. My laboratory started last year, so doing such a collaborative project has really introduced me to a lot of amazing scientists at the NIH. For me the silver lining of it is really experiencing the strengths of the intramural research program at the NIH and being able to meet so many great scientists. Through all of this, just kind of wanting to do what we can to help to either understand or treat the virus.

Barr: As a scientist, how have you discussed COVID-19 with family and friends who may not have a specialized knowledge of the subject as you do?

Sadtler: My family are not scientists. There's not a single scientist in my family. I don't come from science. I don't come from academia. My family all are very interested in what I do. From before the pandemic I worked on Immunology. I worked in our immune system. They heard me ramble off about how interesting our immune cells are for the past 10 years. So, they've already dealt with that background just because I ramble about work. I ramble about science and things that are interesting to me, so they will ask me about things. My sister and brother-in-law are physical therapists and so they see patients every single day. They will contact me and ask, "What do you think about this PPE [personal protective equipment] versus this", or "if so and so got a positive test", but they haven't yet. I think that everybody in my family is keen to learn what they can from me just because I'm more exposed to it and I'm very interested in kind of understanding what's going on more. You don't have to be in the sciences to appreciate science from a scientist, so reach out to your local scientist.

Barr: That's true. Definitely true. What have you turned to for comfort in this very tumultuous period for so many of us?

Sadtler: Chocolate. Always a good tool. I will say, I have picked up my coffee habit again. Good coffee is my morning start. Over the summer we recently adopted a dog, so I've got a little puppy at home which has been great. I spend a lot of time on the phone with my sister. I chat with her all the time; that started while I was up in Boston for a postdoctoral fellowship. I wound up chatting with her and now throughout the pandemic just continued. It's important to have a personal life outside of work. Going hiking, that's a great way to avoid crowds and a great way to avoid busy places. It's being outdoors and then also just spending time either virtually with my family and friends.

Barr: Are there any hobbies that you've picked up although you've been very busy?

Sadtler: I haven't picked up any hobbies. Things have been a little busy over the summer. I would say, for me it's any chance I get out, I'm able to go for a hike or something. Outside is good for me. I love being outdoors. I love hiking. I love backpacking. As I said, I was supposed to be hiking up Kilimanjaro this year. Sad that it didn't happen, but I really hope to, once things slow down a bit, for me to go out camping a little bit more, be able to get out into the wilderness. So, this summer has been a bit busy. I haven't necessarily been able to do those sorts of things, but for good reasons.

Barr: Is there anything else you would like to share about your COVID-19 experiences, either as an NIH employee or just as a person undergoing the pandemic.

Sadtler: Yeah. I'd say the biggest thing is, I would say, that if you have any questions about coronavirus or COVID-19 or anything like that, as mentioned, reach out to your local scientists. We're keen to talk. We're happy to let you know what we know and what we don't know. I'd say that most scientists I know are very approachable about that. Never feel shy about reaching out. I know quite a few scientists are on Twitter nowadays where you can also interact with them, but not necessarily as directly as sending someone an email. I'd say if you have any questions, go ahead and reach out to somebody or read up on their social media or anything like that because scientists are using social media. You post about what you do on social media. I do. I have a Twitter account that I use and I post a bit about science and then a bit about random things in life—my dog. I've posted about hiking. I've posted about a bit of mishmash of science and life.

Barr: You are a person even though you do so many things to help all of us. Thank you very much for spending time and talking with us. We wish you the best in your research and we can't wait to see the results and to learn.

Sadtler: Thanks so much. We're hoping to have it out as soon as possible.

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